

# **RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER**

## **SYLLABUS OF COMPETITIVE EXAMINATION FOR THE POST OF ASSISTANT AGRICULTURE RESEARCH OFFICER (AGRICULTURE CHEMISTRY) AGRICULTURE DEPARTMENT**

### **Part-A**

**- 40 Questions**

#### **General Knowledge of Rajasthan**

##### **Unit-I: History, Culture & Heritage of Rajasthan -**

Pre & early history of Rajasthan. Age of Rajputs: Major dynasties of Rajasthan and the achievements of prominent rulers. Emergence of Modern Rajasthan: factors of socio-political awakening of 19<sup>th</sup> century; Peasants and tribal movements of 20<sup>th</sup> century; Political struggle of 20<sup>th</sup> century and the integration of Rajasthan.

Visual Art of Rajasthan - Architecture of forts and temples of Rajasthan; Sculpture traditions of Rajasthan and various schools of painting of Rajasthan.

Performing Arts of Rajasthan - Folk music and musical instruments of Rajasthan; folk dance and folk drama of Rajasthan.

Various religious cults, saints and folk deities of Rajasthan.

Various dialects and its distribution in Rajasthan; literature of Rajasthani language.

##### **Unit-II: Geography, Natural Resource & Socio-Economic Development of Rajasthan -**

Geography of Rajasthan: Broad physical features- Mountains, Plateaus, Plains & Desert; Major rivers and lakes; Climate and Agro-climatic regions; Major soil types and distribution; Major Forest types and distribution; Demographic characteristics; Desertification, Droughts & Floods, Deforestation, Environmental Pollution and Ecological Concerns.

Economy of Rajasthan: Major Minerals- Metallic & Non- Metallic; Power Resources- Renewable and Non-Renewable; Major agro based industries- Textile, Sugar, Paper & Vegetable oil; Poverty and Unemployment; Agro food parks.

##### **Unit-III: Current Events and Issues of Rajasthan and India -**

Important Persons, Places and Current events of the State. National and International events of importance. New Schemes & Initiatives taken recently for welfare & development in Rajasthan.

**Unit-I**

Chemical (elemental) composition of the earth's crust and soils. Elements of equilibrium, thermodynamics, chemical equilibria, electrochemistry, chemical kinetics and Electrode potential.

Soil Colloids: Inorganic and organic colloids - origin of charge concept of Point of Zero Charge (PZC), diffuse double layer theories of soil colloids, zeta potential, stability, coagulation/flocculation and peptization of soil colloids: electrometric properties of soil colloids; adsorption properties of soil colloids; soil organic matter - fractionation of soil organic matter and different fractions, clay organic interactions.

**Unit-II**

Cation and anion exchange process in soil. AEC, CEC; experimental methods to study ion exchange phenomena and practical implications in plant nutrition. Soil reaction and its influences on nutrient availability. Potassium, phosphate and ammonium fixation in soils. Chemistry of acid soils; active and potential acidity; lime potential; sub-soil acidity.

Chemistry and electrochemistry of submerged soils (Redox potential, oxidation-reduction potential), soil pesticide interaction.

**Unit-III**

Structural chemistry, classification of minerals, chemical composition and properties of clay minerals; genesis and transformation of crystalline and non-crystalline clay minerals; amorphous soil constituents and other non-crystalline silicate minerals; clay minerals in Indian soils.

**Unit-IV**

Factors of soil formation, soil forming processes; weathering of rocks and mineral transformation; soil profile; weathering sequences of minerals with special reference to Indian soils. Concept of soil individual; soil classification system- historical developments and modern system of soil classification with special emphasis on soil taxonomy; soil classification and soil maps.

**Unit-V**

Soil survey and its types; soil survey techniques, soil survey interpretations, soil mapping, mapping units, techniques for generation of soil maps.

Landform - major soil groups of India with special reference to Rajasthan, land capability classification and land irrigability classification, land evaluation. Remote sensing and GIS techniques of soil and water and crop studies.

## **Unit-VI**

Soil physical properties: soil texture, structure, aggregates, soil consistency, soil colour, soil air and soil temperature. Influence of soil temperature and air on plant growth; soil moisture: classification, constants, energy relationship, movement in saturated and unsaturated condition and management.

## **Unit-VII**

Soil fertility and soil productivity; nutrient sources - fertilizers and manures, essential plant nutrients - functions and deficiency symptoms. Sources; forms, immobilization and mineralization of N,P,K and S. Micronutrients; critical limits in soil and plants; factor effecting their availability and correction of their deficiencies in plants, role of chelates in nutrient availability. Manufacturing processes for different fertilizers using various raw materials, characteristics and nutrient contents.

## **Unit-VIII**

Principles of pH meter, EC meter, colorimeter and flame photometer. Common soil test methods for fertilizer recommendations; quantity intensity relationships; soil test crop response correlations and response functions. Fertiliser use efficiency; fertilizer recommendations - usefulness and limitations; site-specific nutrient management, plant need based nutrient management; integrated nutrient management, soil fertility evaluation - knowledge of conduct of field trails/experiments, soil health, indicators for determining soil health, soil quality management and sustainability.

## **Unit-IX**

Soil organic matter and humus, function, structure, formation, C:N ratio, recycling of agricultural and industrial wastes, biological nitrogen fixation and bio-fertilizers. Chemical composition of FYM, Vermicompost, poultry manure and common organic manures.

## **Unit-X**

Area, distribution and management of salt affected soils and poor quality waters, Acid soils, highly and slowly permeable soils. Soil erosion, extent, type and effects, soil conservation techniques, water harvesting techniques and watershed management, remote sensing for soil and watershed management.

## **Unit-XI**

Soil, water and air pollution problems associated with agriculture, nature and extent. Remediation/amelioration of contaminated soil and water.

## Unit-XII

Preparation of solutions for standard curves, analytical reagents, qualitative reagents, indicators and standard solutions for acid-base. Oxidation-reduction and complexometric titration.

## Unit-XIII

Determination of nutrient potentials and potential buffering capacities of soils for phosphorus and potassium, estimation of phosphorus, ammonium and potassium fixation capacities of soils. Electrochemical titration of clays; determination of cation and anion exchange capacities of soils, estimation of exchangeable cations, estimations of root cation exchange capacity. Analysis of soil and plant samples for essential nutrients.

## Unit-XIV

Radioactivity and units, radioisotopes- properties and decay principles, nature and properties of nuclear radiations. Principles and use of radiation monitoring instruments. GM- Counter, solid and liquid scintillation counters. Neutron moisture meter, mass-spectrometry, auto- radiography. Dosages of radiation exposure, radiation safety regulatory aspects.

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<b>Scheme of the examination</b>				
<b>S. No.</b>	<b>Subject</b>	<b>No. of Questions</b>	<b>Total Marks</b>	<b>Examination Duration</b>
Part-A	<b>General Knowledge of Rajasthan</b>	40	40	<b>2.30 Hours</b>
Part-B	<b>Concerned Subject (as prescribed in qualification)</b>	110	110	
	<b>Total</b>	<b>150</b>	<b>150</b>	

1. The competitive examination shall carry 150 marks and 150 questions of Multiple Choice Type questions.  
2. There shall be one paper. Duration of Paper will be Two hours and Thirty Minutes.  
Negative marking shall be applicable in the evaluation of answers. For every wrong answer one-third of the marks prescribed for that particular question shall be deducted.  
Explanation: - Wrong answer shall mean an incorrect answer or multiple answers.

उक्त पद हेतु आयोजित की जाने वाली परीक्षा के लिए ओ.एम.आर. उत्तरपत्रक में प्रश्नों के विकल्प भरने के संबंध में विशेष निर्देश:-

1. Each question has five options marked as 1, 2, 3, 4, 5. You have to darken only one circle (bubble) indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
2. It is mandatory to fill one option for each question.
3. If you are not attempting a question then you have to darken the circle '5'. If none of the five circles is darkened, one third (1/3) part of the marks of question shall be deducted.
4. After solving question paper, candidate must ascertain that he/she has darkened one of the circles (bubbles) for each of the questions. Extra time of 10 minutes beyond scheduled time, is provided for this.

A candidate who has not darkened any of the five circles in more than 10% questions shall be disqualified.